

# Xtra Long Life SP6T Switch

## MSP6TA-12D+

50Ω DC to 12 GHz 24 Volt Absorptive



CASE STYLE: HJ1143-1

### The Big Deal

- Extra long life - 10 million cycles
- Low insertion loss, 0.2 dB
- High isolation, 90 dB typ.
- Absorptive
- Reliable sleep mode switching

### Product Overview

Mini-Circuits' MSP6TA-12D+ is an ultra-reliable, rugged-duty reflective fail-safe SP6T switch designed in break-before-make configuration offering an ultra long switching life. Powered by +24VDC, the device has a typical switching speed of 20 milliseconds, insertion loss of 0.2 dB and high isolation of 90 dB. The MSP6TA-12D+ is suitable for use across a wide range of applications, including switching for automated test equipment and redundancy switching.

### Key Features

Feature	Advantages
Extra long service life	Exceptionally long service life improves system reliability and reduces the need to replace switches often, making it ideal for automated test systems.
High isolation, 90 dB typ.	Prevents interference from unwanted signals, ensuring signal integrity and accuracy of testing.
Reliable sleep-mode switching	Offers dependable performance even after being set at a fixed position for prolonged periods. Highly-reliable sleep mode switching averts failures due to "wake up," making it suitable for automatic testing as well as redundancy switching applications.
High repeatability between switching cycles	High repeatability of switching cycles ensures reliable performance critical for automated testing and other measurement applications.

# Xtra Long Life SP6T Switch

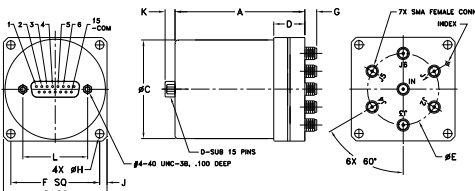
50Ω DC to 12 GHz 24 Volt Absorptive

## Maximum Ratings

Operating Temperature	-15°C to +45°C
Storage Temperature	-15°C to +85°C
RF Power	20W
Control Voltage	26V

Permanent damage may occur if any of these limits are exceeded.

## Outline Drawing

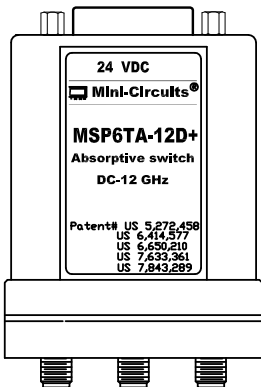


## Outline Dimensions (inch/mm)

A	B	C	D	E	F
2.63	2.10	2.00	.63	1.45	1.800
66.80	53.34	50.80	16.00	36.83	45.72
G	H	J	K	L	wt
.24	.172	.15	.20	1.312	grams
6.10	4.37	3.81	5.08	33.32	230

CONTROL LOGIC		
24V TO PORT (1-6)	ON	OFF
1	IN-J1	J1-T1
2	IN-J2	J2-T2
3	IN-J3	J3-T3
4	IN-J4	J4-T4
5	IN-J5	J5-T5
6	IN-J6	J6-T6

## Marking Drawing



## Features

- ultra-reliable, 10 million cycles
- low insertion loss, 0.2 dB typ.
- high isolation, 90 dB typ.
- break-before-make configuration
- absorptive fail-safe switch
- reliable "sleep-time" switching
- protected by US Patents 5,272,458; 6,414,577; 7,633,361; 7,843,289 and 6,650,210

## Applications

- (ATE) automatic test equipment
- redundancy switching for microwave radio

# MSP6TA-12D+



front view back view  
CASE STYLE: HJ1143-1  
Connectors Model  
SMA MSP6TA-12D+

## +RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

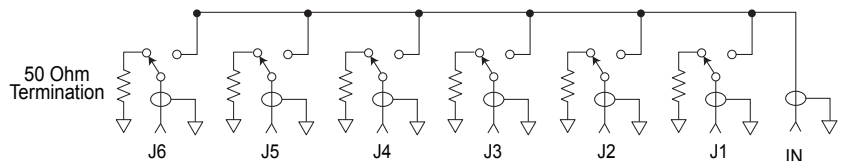
## Electrical Specifications at 25°C

Parameter	Condition	Min.	Typ. (Note 1)	Max.	Unit
Frequency Range		DC	—	12	GHz
Insertion Loss	DC - 1 GHz	—	0.10	0.15	dB
	1 - 6	—	0.15	0.25	
	6 - 8	—	0.20	0.30	
	8 - 12	—	0.25	0.45	
Isolation	DC - 1 GHz	85	100	—	dB
	1 - 6	80	95	—	
	6 - 8	80	90	—	
	8 - 12	80	90	—	
VSWR (Note 2)	DC - 1 GHz	—	1.05	1.10	:1
	1 - 6	—	1.20	1.25	
	6 - 8	—	1.20	1.35	
	8 - 12	—	1.20	1.35	
Operating Voltage Range	DC - 12 GHz	—	24±1.0	—	V
Control Signal (Note 3)	24V	—	85	125	mA
RF Power Cold Switching	—	—	—	20	W
RF Power Hot Switching	0.1W	10 million	—	—	Cycles
	1.0W	—	1 million	—	
Switching Time	DC - 12 GHz	—	20	—	ms

## Notes

1. The performance values represents a common value for the frequency range. For typical performance across the frequency band, see performance graphs in the next page.
2. All ports, all states
3. For port 1N in Energized state only.
4. +24 Volt applied to energized port, COM is negative.

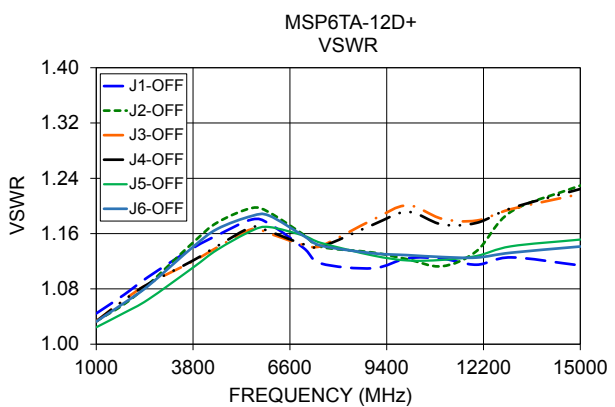
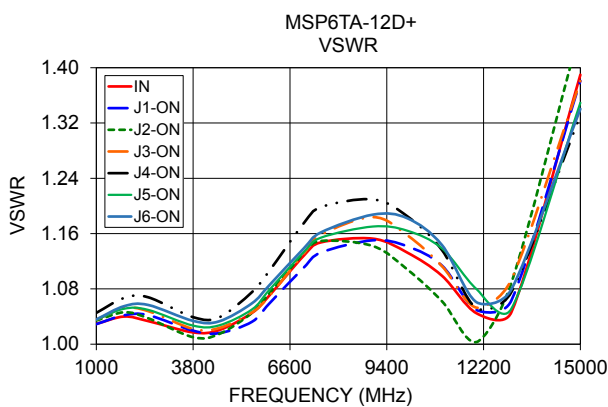
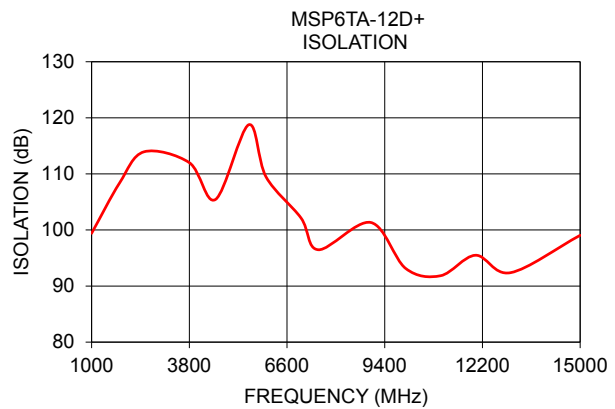
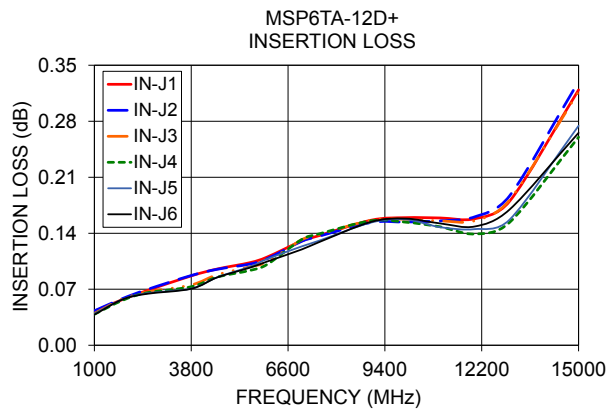
## Switching Position (Non-Energized)



## Typical Performance Data

FREQ. (MHz)	ON INSERTION LOSS (dB)						ISOLATION (dB)		VSWR*					
	IN-J1	IN-J2	IN-J3	IN-J4	IN-J5	IN-J6	IN	J1-ON	J2-ON	J3-ON	J4-ON	J5-ON	J6-ON	
1000	0.04	0.04	0.04	0.04	0.04	0.04	99.41	1.03	1.03	1.03	1.04	1.05	1.04	1.04
1800	0.06	0.06	0.06	0.06	0.06	0.06	108.37	1.04	1.04	1.05	1.05	1.07	1.05	1.05
2500	0.07	0.07	0.07	0.07	0.06	0.06	113.94	1.03	1.04	1.04	1.05	1.07	1.05	1.06
3800	0.09	0.09	0.08	0.07	0.07	0.07	112.01	1.02	1.02	1.01	1.02	1.04	1.03	1.03
4550	0.10	0.09	0.09	0.09	0.08	0.08	105.44	1.02	1.02	1.01	1.02	1.04	1.03	1.03
5500	0.10	0.10	0.10	0.09	0.10	0.10	118.76	1.05	1.03	1.05	1.05	1.08	1.05	1.06
6000	0.11	0.11	0.10	0.10	0.11	0.10	109.45	1.07	1.06	1.07	1.07	1.11	1.08	1.09
7000	0.13	0.13	0.13	0.13	0.12	0.12	102.15	1.13	1.11	1.13	1.13	1.18	1.13	1.14
7500	0.14	0.14	0.14	0.14	0.13	0.13	96.47	1.15	1.13	1.15	1.16	1.20	1.15	1.16
9000	0.16	0.15	0.16	0.16	0.15	0.15	101.34	1.15	1.15	1.14	1.18	1.21	1.17	1.19
10000	0.16	0.15	0.16	0.15	0.16	0.16	93.14	1.13	1.14	1.11	1.16	1.18	1.16	1.18
11000	0.16	0.16	0.16	0.15	0.15	0.15	91.84	1.10	1.11	1.06	1.11	1.14	1.14	1.14
12000	0.16	0.16	0.16	0.14	0.15	0.15	95.49	1.04	1.05	1.00	1.05	1.05	1.08	1.06
13005	0.18	0.19	0.18	0.15	0.16	0.17	92.38	1.05	1.06	1.09	1.09	1.08	1.05	1.08
15000	0.32	0.33	0.32	0.26	0.27	0.27	99.05	1.39	1.38	1.46	1.38	1.33	1.35	1.34

\*See graph below for VSWR OFF state.



### Additional Notes

- Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)

*Typical Performance Data*

FREQUENCY (MHz)	INSERTION LOSS (dB)						ISOLATION (dB)	VSWR (:1)						
	IN-J1	IN-J2	IN-J3	IN-J4	IN-J5	IN-J6		IN	J1-ON	J2-ON	J3-ON	J4-ON	J5-ON	J6-ON
1000	0.04	0.04	0.04	0.04	0.04	0.04	99.41	1.03	1.03	1.03	1.04	1.05	1.04	1.04
1200	0.05	0.05	0.04	0.04	0.04	0.04	118.97	1.03	1.03	1.04	1.04	1.05	1.04	1.04
1400	0.05	0.05	0.05	0.05	0.05	0.05	105.29	1.04	1.04	1.04	1.05	1.06	1.05	1.05
1600	0.05	0.05	0.05	0.05	0.05	0.05	104.18	1.04	1.04	1.05	1.05	1.06	1.05	1.05
1800	0.06	0.06	0.06	0.06	0.06	0.06	108.37	1.04	1.04	1.05	1.05	1.07	1.05	1.05
2000	0.06	0.06	0.06	0.06	0.06	0.06	116.10	1.04	1.04	1.05	1.05	1.07	1.05	1.06
2200	0.06	0.07	0.06	0.06	0.06	0.06	109.06	1.04	1.04	1.04	1.05	1.07	1.05	1.06
2400	0.06	0.07	0.06	0.06	0.06	0.06	108.67	1.04	1.04	1.04	1.05	1.07	1.05	1.05
2500	0.07	0.07	0.07	0.07	0.06	0.06	113.94	1.03	1.04	1.04	1.05	1.07	1.05	1.06
2600	0.07	0.07	0.06	0.06	0.06	0.06	111.12	1.03	1.04	1.04	1.04	1.06	1.05	1.06
2800	0.07	0.07	0.06	0.06	0.07	0.07	108.50	1.03	1.04	1.03	1.04	1.06	1.05	1.05
3000	0.07	0.07	0.06	0.06	0.07	0.07	105.04	1.02	1.03	1.03	1.04	1.05	1.04	1.05
3200	0.07	0.07	0.07	0.06	0.07	0.06	115.33	1.02	1.03	1.02	1.03	1.05	1.04	1.05
3400	0.07	0.07	0.07	0.07	0.07	0.07	115.15	1.02	1.03	1.02	1.03	1.05	1.03	1.04
3600	0.08	0.08	0.07	0.07	0.07	0.07	108.69	1.02	1.03	1.01	1.03	1.04	1.03	1.04
3800	0.09	0.09	0.08	0.07	0.07	0.07	112.01	1.02	1.02	1.01	1.02	1.04	1.03	1.03
4000	0.09	0.09	0.08	0.08	0.08	0.08	134.23	1.02	1.02	1.01	1.02	1.04	1.03	1.03
4200	0.09	0.09	0.08	0.08	0.08	0.08	109.88	1.02	1.02	1.01	1.02	1.04	1.03	1.03
4400	0.09	0.09	0.09	0.08	0.08	0.08	111.60	1.02	1.02	1.01	1.02	1.04	1.03	1.03
4550	0.10	0.09	0.09	0.09	0.08	0.08	105.44	1.02	1.02	1.01	1.02	1.04	1.03	1.03
4600	0.09	0.10	0.09	0.09	0.09	0.09	114.75	1.02	1.02	1.01	1.02	1.04	1.03	1.04
4800	0.10	0.10	0.09	0.08	0.09	0.09	111.59	1.02	1.02	1.02	1.02	1.05	1.03	1.04
5000	0.10	0.10	0.09	0.09	0.09	0.09	107.38	1.02	1.02	1.02	1.03	1.05	1.03	1.04
5200	0.10	0.10	0.09	0.09	0.09	0.09	107.30	1.03	1.03	1.03	1.03	1.06	1.04	1.05
5400	0.10	0.10	0.10	0.09	0.10	0.09	116.56	1.04	1.03	1.04	1.04	1.07	1.05	1.06
5500	0.10	0.10	0.10	0.09	0.10	0.10	118.76	1.05	1.03	1.05	1.05	1.08	1.05	1.06
5600	0.11	0.10	0.10	0.09	0.10	0.10	108.61	1.05	1.04	1.05	1.05	1.08	1.06	1.06
5800	0.11	0.11	0.10	0.10	0.10	0.10	106.91	1.06	1.05	1.06	1.06	1.09	1.07	1.07
6000	0.11	0.11	0.10	0.10	0.11	0.10	109.45	1.07	1.06	1.07	1.07	1.11	1.08	1.09
6200	0.11	0.11	0.11	0.10	0.11	0.11	102.21	1.08	1.07	1.09	1.08	1.12	1.09	1.09
6400	0.12	0.12	0.11	0.11	0.11	0.11	117.85	1.09	1.08	1.10	1.09	1.13	1.10	1.10
6600	0.12	0.12	0.12	0.12	0.11	0.11	103.11	1.11	1.09	1.11	1.11	1.15	1.11	1.12
6800	0.13	0.13	0.12	0.12	0.12	0.12	110.48	1.12	1.10	1.12	1.12	1.16	1.13	1.13
7000	0.13	0.13	0.13	0.13	0.12	0.12	102.15	1.13	1.11	1.13	1.13	1.18	1.13	1.14
7200	0.13	0.13	0.14	0.14	0.13	0.13	101.77	1.14	1.12	1.14	1.14	1.18	1.14	1.15
7400	0.13	0.14	0.14	0.14	0.13	0.13	107.96	1.14	1.13	1.15	1.15	1.19	1.15	1.16
7500	0.14	0.14	0.14	0.14	0.13	0.13	96.47	1.15	1.13	1.15	1.16	1.20	1.15	1.16
7600	0.14	0.14	0.14	0.15	0.13	0.13	99.86	1.15	1.14	1.15	1.16	1.20	1.16	1.17
7800	0.14	0.14	0.15	0.15	0.14	0.14	111.36	1.16	1.14	1.16	1.17	1.21	1.16	1.17
8000	0.15	0.15	0.15	0.15	0.14	0.14	101.41	1.16	1.14	1.16	1.18	1.21	1.17	1.18
8200	0.15	0.15	0.15	0.15	0.14	0.14	103.77	1.16	1.15	1.16	1.18	1.21	1.17	1.18
8400	0.15	0.15	0.16	0.16	0.15	0.15	108.45	1.16	1.15	1.16	1.18	1.21	1.17	1.19
8600	0.15	0.15	0.15	0.15	0.15	0.15	99.85	1.16	1.15	1.15	1.18	1.21	1.17	1.19
8800	0.15	0.15	0.15	0.15	0.15	0.15	110.06	1.16	1.15	1.15	1.19	1.21	1.17	1.19
9000	0.16	0.15	0.16	0.16	0.15	0.15	101.34	1.15	1.15	1.14	1.18	1.21	1.17	1.19
9200	0.16	0.16	0.16	0.16	0.15	0.16	98.92	1.15	1.15	1.14	1.18	1.20	1.17	1.19
9400	0.16	0.16	0.16	0.16	0.16	0.16	97.60	1.15	1.15	1.13	1.18	1.20	1.17	1.19
9600	0.16	0.15	0.15	0.15	0.16	0.16	101.23	1.14	1.15	1.12	1.17	1.20	1.17	1.19
9800	0.16	0.15	0.15	0.15	0.16	0.16	104.22	1.14	1.14	1.12	1.17	1.19	1.17	1.19
10000	0.16	0.15	0.16	0.15	0.16	0.16	93.14	1.13	1.14	1.11	1.16	1.18	1.16	1.18
10200	0.16	0.15	0.16	0.15	0.15	0.16	93.55	1.13	1.14	1.10	1.15	1.18	1.16	1.18
10400	0.16	0.15	0.16	0.15	0.15	0.16	96.67	1.12	1.13	1.09	1.14	1.17	1.16	1.17
10600	0.16	0.15	0.16	0.15	0.15	0.16	97.75	1.12	1.13	1.08	1.14	1.16	1.16	1.17
10800	0.16	0.15	0.16	0.15	0.15	0.15	98.95	1.11	1.12	1.07	1.12	1.15	1.15	1.15
11000	0.16	0.16	0.16	0.15	0.15	0.15	91.84	1.10	1.11	1.06	1.11	1.14	1.14	1.14
11200	0.16	0.16	0.16	0.14	0.15	0.15	101.74	1.09	1.11	1.05	1.11	1.12	1.13	1.13
11400	0.16	0.16	0.15	0.14	0.15	0.15	97.34	1.08	1.10	1.04	1.09	1.11	1.12	1.11
11600	0.16	0.16	0.15	0.14	0.14	0.15	106.41	1.07	1.08	1.03	1.08	1.09	1.11	1.10
11800	0.16	0.16	0.16	0.14	0.15	0.15	97.70	1.06	1.06	1.01	1.06	1.07	1.10	1.08
12000	0.16	0.16	0.16	0.14	0.15	0.15	95.49	1.04	1.05	1.00	1.05	1.05	1.08	1.06
12200	0.16	0.16	0.16	0.14	0.14	0.15	97.61	1.03	1.03	1.02	1.04	1.03	1.06	1.04
12400	0.16	0.17	0.16	0.14	0.14	0.15	93.94	1.02	1.02	1.03	1.05	1.02	1.05	1.02
12600	0.17	0.17	0.17	0.14	0.14	0.15	98.49	1.02	1.02	1.05	1.06	1.03	1.05	1.03
12800	0.17	0.18	0.17	0.15	0.15	0.16	93.41	1.03	1.04	1.07	1.07	1.05	1.04	1.05
13000	0.18	0.19	0.18	0.15	0.16	0.17	91.68	1.05	1.06	1.09	1.09	1.07	1.05	1.08
13005	0.18	0.19	0.18	0.15	0.16	0.17	92.38	1.05	1.06	1.09	1.09	1.08	1.05	1.08
13400	0.20	0.21	0.21	0.17	0.17	0.19	90.48	1.09	1.11	1.14	1.14	1.12	1.10	1.13
13500	0.21	0.22	0.22	0.18	0.18	0.19	93.71	1.11	1.13	1.15	1.15	1.13	1.11	1.14
14000	0.25	0.25	0.26	0.20	0.21	0.22	91.98	1.19	1.21	1.24	1.22	1.20	1.18	1.21
14500	0.29	0.28	0.29	0.23	0.24	0.25	98.25	1.28	1.30	1.34	1.30	1.26	1.26	1.28
15000	0.32	0.33	0.32	0.26	0.27	0.27	99.05	1.39	1.38	1.46	1.38	1.33	1.35	1.34



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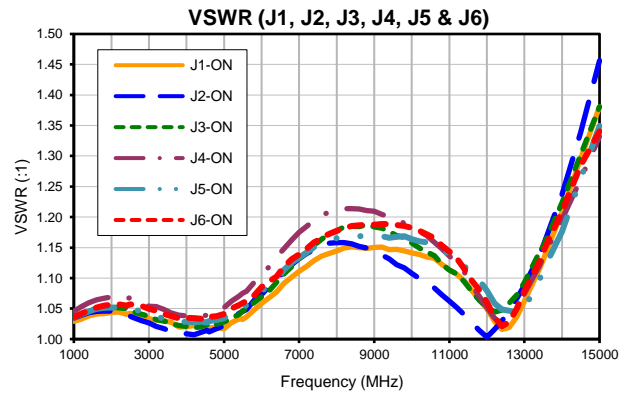
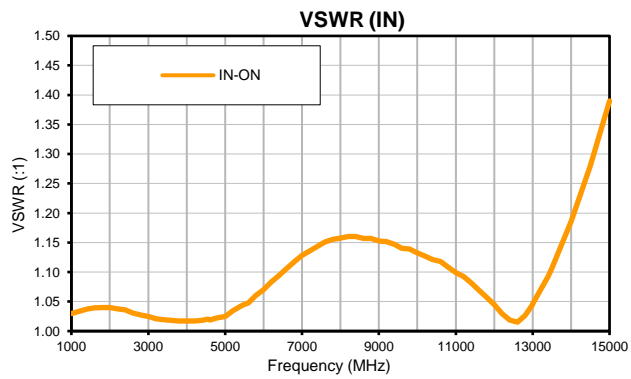
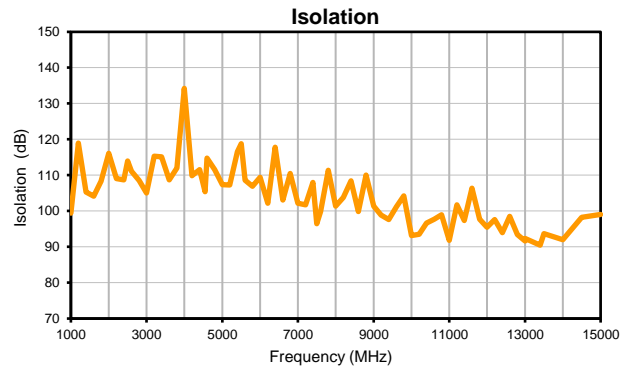
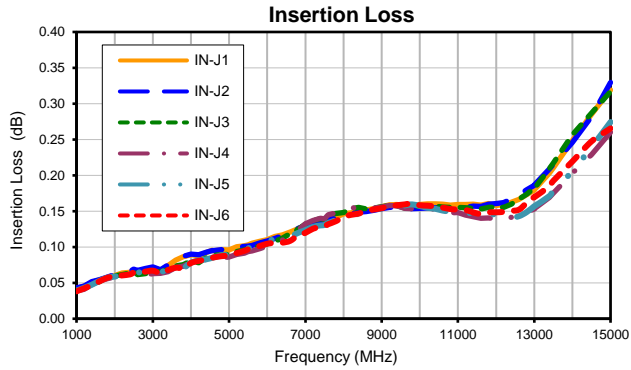
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IF/RF MICROWAVE COMPONENTS

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MSP6TA-12D+  
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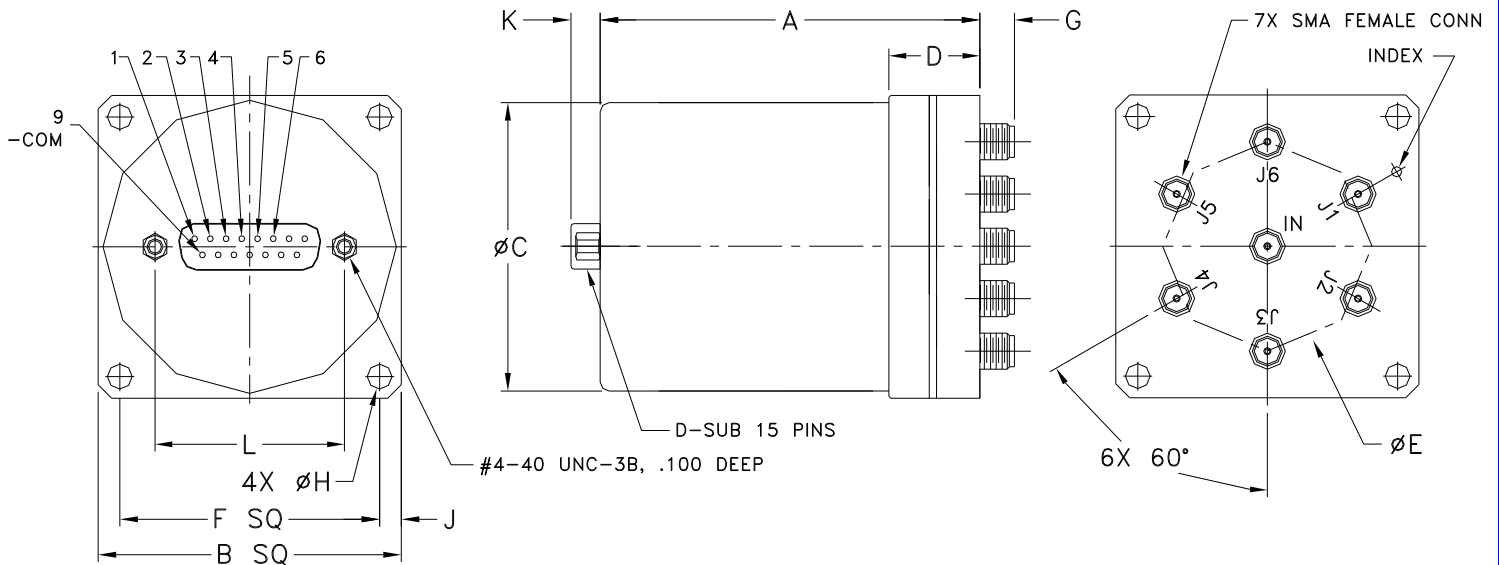
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## Typical Performance Curves



## Outline Dimensions

HJ1143-1



CASE#	A	B	C	D	E	F	G	H	J	K	L	WT. GRAM
HJ1143-1	2.63 (66.80)	2.10 (53.34)	2.00 (50.80)	.63 (16.00)	1.45 (36.83)	1.800 (45.72)	.24 (6.10)	.172 (4.37)	.15 (3.81)	.20 (5.08)	1.312 (33.32)	230

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .03$ ; 3 Pl.  $\pm .015$

### Note:

- Case material: Copper-Nickel alloy.



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Mini-Circuits ISO 9001 & ISO 14001 Certified

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-15° to 45°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-15° to 85°C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 96 hours, 40°C	MIL-STD-202, Method 103B, Condition B, Except 50°C
Thermal Shock	-55° to 100°C, 50 cycles	MIL-STD-202, Method 107, Condition B, except -55° to +100°C and 50 cycles
Vibration (High Frequency)	0.06-inch double amplitude, 10-55 Hz, 2 hours in each of three perpendicular directions (total 6 hours)	MIL-STD-202, Method 204, Condition C, Part 1
Mechanical Shock	50G, 11 ms sawtooth, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition G
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215